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SPICED and PICKLED SEAFOODS

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UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Bureau of Commercial Fisheries

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Created in 1849, the Department of the Interior—America's Department of Natural Resources—is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

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BUREAU OF COMMERCIAL FISHERIES, Donald L. McKernan, Director

Washington, D.C. October 1963

SPICED AND PICKLED SEAFOODS

by Norman D. Jarvis

Pickling with vinegar and spices is a very ancient form of food preservation, going back to prehistoric times. Stevenson (1899) believes that it probably antedates even pickling with salt. It is mentioned frequently in the writings of the Greeks and Romans, as witnessed by the citations of Smidth (1873) and Radcliffe (1921) in their excellent accounts of the fisheries of the ancients. Certain of these fishery products prepared with vinegar and spices were considered great delicacies, selling at such high prices that they were reserved for the banquet tables of the rich. One dish popular in Spain and in the Latin American republics of Central and South America today is "escabeche." It is prepared by frying fish in oil with bay leaves and spices, then marinating in vinegar and oil. This dish can be traced directly to the Romans, who in turn had it from the Greeks.

Pickling with vinegar was used extensively down through the Middle Ages, especially for fish that were fat and did not cure well by the very crude salting methods of the times. While the product did not keep so long, it was more appetizing than the dried and salted products of the period. Vinegar-pickled fish played a very important part in the food economy of the north European people down through the seventeenth century.

Brine-salted fish is often called "pickled," but this is a misnomer, if the name as applied to other food products is considered. Pickled foods are fermented in the process of manufacture with the formation of organic acids. If the amount of organic acids formed is not sufficient, more acid may be added in the form of vinegar; or vinegar may be used in the original cure instead of depending on the natural formation of acid. Therefore, only fish preserved with vinegar or vinegar and spices should be considered pickled.

PRESERVATIVE ACTION OF INGREDIENTS

Vinegar differs from salt as a preservative agent in that it does not preserve by osmosis, extracting

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water from the food, but enters into chemical combination with the product, reducing or inhibiting bacterial activity. The spices used may also have some slight value as a preservative; in fact through the Middle Ages pepper and other spices were valued as preservatives rather than condiments. Foods of this period were often very highly spiced, and it is probable that spoilage was masked rather than inhibited. The preservative action of vinegar is probably due to the fact that spoilage molds are inhibited and bacteria greatly retarded, if the product has a low pH, that is, if the medium has an acid reaction. The active principle is the acetic acid in vinegar. According to Tressler (1923) an acid content of 15 percent is required to entirely prohibit bacterial action. Since commercial vinegars average 6 percent acetic acid content, and stronger vinegars reduced to this level are as low as 3 percent when used in food preservation, fish products put up in vinegar are only temporarily preserved. However, vinegars containing 3 percent acetic acid will preserve fish for months if the product is held in chill storage.

REQUIREMENTS FOR INGREDIENTS

Fish used in the vinegar-spice cure must, of course, be of the best quality. Equally important, however, in obtaining a finished product of the highest grade, is the quality of the various accessory ingredients. The flavor, texture, color, and to some extent, the keeping quality are affected by the water, salt, sugar, vinegar, spices, herbs, and other miscellaneous ingredients.

The water must be potable and approved under all sanitary and health codes. Pond or shallow-well water should not be used. "Hard" waters are unsuitable, especially those with a high iron, calcium, or magnesium content. If the water supply is hard, the water must be filtered or a softener used. Brines should be boiled and filtered before use.

The vinegar should be clear, without foreign odors or flavors and should have a guaranteed acetic-acid content. Cider or other fruit vinegars should not be used because their acid content is extremely variable and the fruit esters in the vinegar might give the pickled fish an "off flavor." Distilled vinegar is recommended. Acetic acid diluted to the desired strength may be used. A 120 grain (2½ percent) malt vinegar is favored by some commercial packers. Vinegar should be titrated regularly to determine whether it has the required acid content. Wine may be used as a flavoring agent, as in a spiced wine sauce added to the pickled fish, but wine or wine vinegar should not be used in the original pickle cure.

The quality of the salt is also important. A high grade of purity is required. European curers prefer a Liverpool fishery salt. The salt must be as free as possible from calcium and magnesium compounds, as these impurities give a bitter flavor to the cured product. A coarse, half-ground salt will pit the surface of the pickled fish. A finely-ground cooking salt, guaranteed to contain less than one percent

impurities and preferably mined, is recommended.

Experienced packers of spiced fish prefer a good grade of cane sugar. Some use is made of corn sugar but the quantity must be adjusted to obtain the same results with the standard formula. It is not a completely satisfactory substitute to date.

Spices should be bought whole and on the basis of chemical and microscopic examination. Buying specifications should require that the spices be fresh and of a high grade of purity. Ground spices should not be purchased as they may be readily adulterated with other plant material. Mixtures of whole spices may be composed of old or inferior spices. As a rule the curer should buy fresh whole spices, singly, and make up his own mixture. Spices should not be held much more than a year.

Essential spice oils should meet the requirements of the United States Pharmacopoeia. Both spices and oils should be bought only from well-known, reputable firms specializing in these products. "Bargain" spices are usually ruinous to quality products.

HERRING

Herring is the most important pickled fish product. Some of the more common pickled-herring products are appetitsild, Bismarck herring, cut spiced herring, gabbelbissen, gaffelbiter, Kaiser Friedrich herring, potted herring, rollmops, Russian sardines, gewurz herring, delicatessild, sur-sild, and smorgaas-sild. The names indicate that most of the spiced herring products prepared in the United States are of foreign origin. The composition of the sauce is the principal point of difference between many of these products. Kaiser Friedrich herring, for instance, are Bismarck herring in mustard sauce, while rollmops are Bismarck-herring fillets rolled around a piece of dill pickle. Bismarck herring are boned, with sides still joined, and packed in vinegar and spices.

Spiced herring packed in the United States is prepared entirely from fish cured during the fishing season, held in storage, and made into spiced-herring products as the market requires. Herring may be specially cured for this purpose, although Scotch-cured or Labrador salt herring may be substituted. Herring not specially cured for spicing is reported to have a shorter period of preservation, to be darker in color, lacking in flavor and tougher and more fibrous in texture. One of the most common methods for home preparation of salt herring is to pickle it with vinegar and spices. At one time salt herring were used extensively for commercial vinegar-pickled herring but such raw material is used today only when the stock of specially cured herring is exhausted, or in places where they cannot be obtained.

Most of the specially-cured herring are prepared from alewives or river herring (*Pomolobus pseudoharengus*) in the Chesapeake Bay area.

A variety of curing methods are used, of which the following is typical: The herring are cut or dressed as described in the salting of alewives. The cut herring are cleaned thoroughly, with special attention to removal of the kidney, which is the dark streak along the backbone. The fish are rinsed in fresh water and placed in a curing tank where they are covered with a brine testing 80° to 90° salinometer that contains 120-grain distilled vinegar amounting to an acidity of about 2½ percent. The fish are left in this brine until the salt has struck through, or completely penetrated the flesh. The fish, however, must be removed before the skin starts to wrinkle or lose color. The length of cure depends on the judgment of the curer and varies with the temperature conditions, freshness and size of the fish. The average length of cure is reported to be 5 days. Various sources of information give curing times varying from 3 to 7 days.

When the herring are sufficiently cured they are packed in barrels. These are often second-hand, previously used for soda fountain syrup. As a rule, no attempt is made to pack in regular layers. The herring are simply shoveled in until the barrel will hold no more. The barrels are headed, filled with a salt-vinegar brine testing 70° salinometer, and shipped to marketing centers such as Chicago or New York for final manufacture. There the herring are repacked in kegs which are then filled with a solution of distilled vinegar diluted with water to a 3 percent acidity, and containing sufficient salt to test 35° salinometer. Before the fish are repacked they may be cut into fillets or the backbone may be removed with the fish left otherwise whole. The kegs are then put into cold storage at 34° F. to be held until required.

The final process of manufacture is begun by soaking the herring in a tank of cold water from 8 to 10 hours. They are then removed, drained and placed in a solution of vinegar, salt, and water for 72 hours. The solution is made in the proportion of 1 gallon of 6 percent white distilled vinegar to 1 gallon of water and 1 pound of salt. The fish should be well covered with the solution. They are then made into cut spiced herring, rollmops, or Bismarck herring.

Cut Spiced Herring I

The vinegar-salt-cured herring are cut across the body in pieces 1 to 2 inches long. The sliced herring are then packed in 8-ounce tumblers or in 16- or 32-ounce glass jars, with whole mixed spices. The amount of spices added to each container is approximately one teaspoon to an 8-ounce tumbler, 2 teaspoons to a 16-ounce jar and 1 tablespoon to a 32-ounce jar. A slice or two of onion, a slice of lemon, or a strip of canned pimiento, and a bay leaf or two may be placed around the sides for ornament, depending on the preference of the individual packer. Each container is then filled with vinegar diluted to 2½ percent acidity, containing ½ pound of sugar ¼ pound

of salt, 10 drops oil of cloves, 10 drops oil of allspice, and 10 drops oil of cardamom per gallon of solution. The spice oils are usually added to the sugar before dissolving it in solution to distribute the spice flavor more evenly.

The amount and variety of spice flavors may be altered to suit the taste of the packer or his market. The formula given is typical but is not claimed to be standard. The jars are vacuum sealed, wiped clean, labeled, and packed one or two dozen jars to the fiberboard carton. The length of preservation depends on the care in manufacture and the temperature of the storage. If held under refrigeration at 40° F. this product should remain in good condition at least 6 months. Exposure to light causes the herring to deteriorate more rapidly, even if held under refrigeration, as in a refrigerated show case.

Cut Spiced Herring II

The cut pieces of herring are packed in wooden tubs holding 10 or 20 pounds, or if they are to be repacked in individual glass containers, in kegs holding 100 pounds. A few spices, a bay leaf or two, and several slices of onion are placed in the bottom of the container, then a layer of cut herring, on which are laid spices and onion. This is repeated until the tub or keg is filled. The fish are covered with vinegar diluted with water in which the sugar is dissolved. The containers are then stored at 40° F. to cure for 10 days. At the end of this time if the fish are to be repacked, they are removed from storage and filled into 8-, 16-, and 32-ounce glass jars. The vinegar used in curing may be strained and re-used but some prefer to use fresh vinegar diluted to three percent acidity. A few of the spices, bay leaves and a little chopped onion are placed in each jar.

The quantities given in the formula below are sufficient for 10 pounds of cleaned herring. Whole spices are used in all recipes, unless otherwise specified.

10 lb. salt herring
2 oz. mustard seed
1 oz. bay leaves
1 oz. allspice
1 oz. black peppers
1 oz. white peppers
1 oz. red (chili) peppers
½ oz. cloves
2½ oz sugar
4 oz. onions, sliced
2 qt. water
2 qt. vinegar (6 percent acidity)

There are other recipes for the preparation of cut spiced herring. Cut spiced herring in tubs usually go to delicatessen shops or other wholesale outlets.

Rollmops

The vinegar-cured fillets are wrapped around a piece of dill pickle or a pickled onion. The rolls are fastened with wooden toothpicks, cured several days in a spiced-vinegar sauce, then packed in glass containers, generally of the same sizes used for cut spiced herring. Anderson (1925) made a comprehensive study of the packing of rollmops. The formula given here is the one recommended by him:

10 lb. salt herring
4 oz. chopped onions
2½ oz. sugar
¼ oz. whole cloves
1/16 oz. powdered nutmeg
1/16 oz. cracked cinnamon

¼ oz. mustard seed
¼ oz. chili peppers
⅛ oz. bay leaves
⅛ oz. whole black peppers
⅛ oz. whole white peppers
¼ oz. whole allspice
1/16 oz. cracked ginger
1/16 oz. crushed cardamom
2 qt. distilled vinegar (5 percent acidity)
8 qt. dill pickles

Put the bay leaves and chili peppers in a small cloth bag so they can be easily separated for later use. Place this bag together with the balance of the spices and three-fourths of a quart of vinegar into a covered receptacle. Bring to boil and allow to simmer for one and one-half to two hours. Violent boiling causes loss of the volatile acetic acid. A very simple way is to put the spices in a common fruit jar and place in boiling water for two hours. Allow to stand 1 to 2 weeks after boiling to insure still greater extraction of the spicing materials. Remove the chili peppers and bay leaves which are to be used for decorative purposes. Strain the pickle through a cloth bag to remove the spices. These should be well mixed, ready for adding to the jars before packing. Slightly less than three-fourths of a quart of pickle will be obtained.

Preparation of the fish Remove heads, scale, and wash. Split into two fillets and trim. Freshen two and one-half hours in running water, then drain. Ten pounds of medium size herring should give about 6 pounds drained weight.

Preliminary vinegar-cure Pack the fillets skin down in a stone crock. Cover with one and one-fourth quarts of vinegar. If necessary, put a light weight on top to keep the fillets well covered. Allow to cure in a cool place for 40–48 hours. Remove and drain. The vinegar should now test about 2 percent acid and show a salinometer reading of about 30°. The fish has absorbed much of the acid and has lost some salt.

Packing Cut each dill pickle lengthwise into four parts, then each of these across the center, making eight pieces in all.

Roll the fillets around a piece of pickle and fasten with a fresh clove. A clove serves the purpose just as well as a toothpick and adds to the attractiveness of the pack.

Place one teaspoonful of mixed used spices on the bottom of the jar, then pack the fish. With a medium sized herring, three rolls will pack nicely into a No. 306 jar (six fluid ounces capacity) if placed on end. Decorate around the sides with a couple of chili peppers and a bay leaf. Add sufficient pickle to fill from 25 to 35 cc. (this is about equivalent to two level tablespoonfuls). The net weight should be five and one-half ounces or over. Seal the jars immediately after packing. Vacuum sealing is preferable.

Store in a cool place. Cold storage at about 35° F. is advisable to insure longest preservation.

If vinegar-salt-cured herring are used, the preparation and preliminary vinegar-cure steps will be unnecessary. It is believed that a better product will be obtained if the vinegar-salt-cure herring are used. Test packs, by the writer, of Anderson's formula indicate that the spice-vinegar sauce should be diluted to 3 percent acidity, that the rollmops should be cured in the spice sauce for 10 days, then repacked in jars with a few spices, and the jars should be filled with fresh 3-percent vinegar with 2 tablespoons sugar and 1 of salt to the quart. Store at 34° to 40° F.

Bismarck Herring

The vinegar-salt-cured fish are treated as in the preparation of cut spiced herring up to the point of slicing. Instead of slicing, the backbone is removed, but the two sides are left joined together along the back and trimmed of thin ragged edges of belly flesh. The boned

and trimmed fish are packed with vinegar and spice oils or spices as described for the preparation of cut spiced herring. They are left to cure at 40° F. for 10 days. At the end of this time, the fish are packed vertically in glass containers of sizes such as 8-ounce tumblers, and 16- or 32-ounce glass jars. A few fresh spices and a bay leaf with a slice of lemon or other similar decorative agents to suit the preference of the packer are placed around the sides of the jars. The jars are then filled with distilled vinegar, diluted to 3-percent acidity. The containers are sealed, cleaned, and packed into cartons.

Gaffelbiter

Take fat mild-cure salt herring, cut into fillets, and skin. The fillets are then freshened in running water 2 to 3 hours depending on the size of the herring, whether mild or heavy cure, and local market preference. The fillets are then cut into sections about one inch in length and packed in tubs or small crocks, with chopped onion, bay leaves, whole black peppers, whole cloves, and mustard seed, mixed with the fish. The herring are then covered with distilled vinegar, from 3 to 5 percent acidity, and left to cure in cool storage (about 40° F.) for 48 hours. They are then packed in glass containers, filled with fresh vinegar or the vinegar used in curing, but strained before reuse. The jars are sealed, wiped, and packed into cartons.

This product differs from gaffelbiter as prepared in the Scandinavian countries. It is descriptive of the method as developed in the United States for the Scandinavian-American market. The formula was obtained from a Scandinavian-American fish curer. The ingredients are given below:

16 lb. mild-cure herring	¼ oz. whole black peppers
1 qt. vinegar (6 percent distilled)	¼ oz. whole white peppers
1 qt. water	¼ oz. whole cloves
8 oz. chopped onions	¼ oz. mustard seed
	⅛ oz. bay leaves

Gabelbissen

Fresh fat herring is used for gabelbissen. The round herring are first cured for 30 to 40 hours in a brine testing 90° salinometer. In some instances, however, this preliminary brine cure is omitted and the fresh fish are packed directly into barrels. A special curing mixture is scattered on the bottom of the barrel between the fish and over each layer. The herring are packed much as described for the packing of whole salt herring, with bellies straight up and tails overlapping. The layers of fish are packed in rather loosely. The barrels are headed up and put in cold storage at about 40° F., where they are held for several months to cure and ripen.

At the end of about three months the herring are removed from storage, drained well, headed, boned, and skinned. The fillets may be cut into sections and packed in glass containers, or whole fillets may be packed in oval or oblong flat cans. A bay leaf and a thin slice of lemon may be laid in each can. The containers may be filled up with the

original curing brine diluted one-half with distilled vinegar or they may be packed in wine sauce, dill sauce, or curry sauce. The containers are sealed, cleaned, packed in cartons and held under refrigeration until sold to the retail consumer. The curing mixture is as follows:

220 lb. herring	4 oz. cardamom
22 to 35 lb. salt	2 oz. ginger
4 lb. sugar	6 oz. hops
2.2 lb. black peppers	2 oz. cloves
2.2 lb. white peppers	2 oz. cinnamon
18 oz. allspice	3 oz. saltpeter
11 oz. coriander	

The spices are ground coarsely, at the time the mixture is made up, and mixed thoroughly with the salt, sugar, and saltpeter.

Matjeshering

This is another spiced-herring product considered very choice in northern Europe. It is prepared from fresh, full herring, that is, herring with milt or roe. The fish are first washed and scaled. Then the gills are removed and the intestines are pulled out through the gill opening so that the throat or belly wall are not cut open. The fish are soaked from 12 to 18 hours in a 7 percent solution of white wine vinegar. They must be taken from this solution before the skin becomes soft and flabby.

They are wiped dry and rolled in a curing mixture consisting of 2.2 pounds salt, 1.1 pounds brown sugar, and 4 ounces saltpeter. This amount is supposed to be sufficient for the unit quantity, a small keg of 75 herring. The next step is to pack the herring in small kegs, with the backs up and the layers straight. Some of the curing mixture is scattered between the fish as they are packed and some is sprinkled over each layer.

After 24 to 48 hours the fish are repacked, using the original brine. If enough brine has not formed, sufficient additional brine to cover the fish is made from one part of the salt-sugar mixture to four parts water. This is boiled, cooled, and filtered before using. The kegs are stored at 40° F. for at least one month or until the product is considered ready for use.

Gewurzhering

This product is prepared in the same way as matjeshering, but spices are added to the curing mixture.

75 herring	1 oz. ginger
4 oz. black peppers	1 oz. cloves
2 oz. chili peppers	1 oz. cinnamon
2 oz. allspice	1 oz. nutmeg
1 oz. coriander	

The spices are ground and added to the salt-sugar mixture when it is made up.

Russian Sardines I

This is a favorite product in northern Europe, where large quantities are prepared. It has been packed in the United States for about 80 years. Production has been small of recent years since this product requires small herring of the size most desirable for Maine sardine canning. There are several different methods of cure, of which two are given here.

Wash and scale 10 pounds of small, fresh round herring (from 5 to 7 inches). Remove the gills and as much of the intestines as possible by pulling them out through the

gill flap without tearing the throat or belly. Rinse again, drain, and pack in a large crock or tub. Cover with 3 parts of distilled vinegar and 1 part water. For this amount of fish, 3 pints of 6 percent distilled vinegar and 1 pint of water will be required. Allow the herring to stand for about 12 hours.

10 lb. fresh herring	½ oz. bay leaves
2 lb. fine salt	½ oz. cloves
1 lb. powdered sugar	½ oz. ginger
1 oz. allspice	½ oz. hops
1 oz. black peppers	½ oz. nutmeg
½ oz. saltpeter	

The spices should be finely ground just before use and blended with the other ingredients.

After the fish have drained, they are dredged in the spice mixture and packed in crocks or tubs, bellies up. A small additional amount of the mixture may be scattered between each layer. The layers should be packed at right angles to each other with the top layer packed backs up. The balance of the spice-curing mixture is scattered over the top layer and the fish are weighted down so that they will be entirely covered when the brine forms. Some packers also scatter chopped onions, ground or sliced horseradish, and capers between each layer. The amounts of these ingredients required for 10 pounds of small herring are: ½ pound onions, ¼ pound horseradish, and a small bottle of capers (about 2½ ounces). The fish are held in cool storage for at least 2 weeks before repacking in small kegs holding about 7 pounds, or in glass jars. The brine formed in curing is filtered and poured into the containers before closing.

Russian Sardines II

Fresh small herring (5 to 7 in.) are packed in 90° to 100° salinometer brine as soon as possible after catching. They are left in the brine about 10 days until they are thoroughly salt-cured or struck through, the exact time depending on the size of the fish and the weather. The salted fish are then headed, pulling out the viscera with the same stroke of the knife without tearing the belly open. They are then washed in clean water and placed on wire trays for draining. After the herring have drained for several hours they are taken to packing tables where they are sorted according to size. Each size is packed separately in small kegs holding about 7 pounds each. A scattering of spices and flavoring ingredients is laid in the bottom of the keg. A layer of herring is placed with backs up. The layer is then pressed down slightly. A thin layer of spices and a little vinegar is then added. The process is repeated until the keg is filled. As much vinegar as the keg will hold is then poured in and the container is headed up. The fish require some time to season before they are put on the market. In summer they are ready for sale in 4 or 5 days but in winter 3 or 4 weeks may be required. If the product is held in refrigeration at about 40° F. it will remain in good condition for a year. Stevenson (1899) gives the following ingredients as sufficient to cure 120 pounds of herring:

120 lb. fresh herring.	½ lb. ginger
2 gal. vinegar	4 lb. sliced onion
1.5 lb. allspice	2 lb. horse-radish
1 lb. bay leaves	½ lb. chili peppers
½ lb. cloves	½ lb. coriander seed
	2½ oz. capers

Other spices may be used to suit the preference of the market and packer.

Potted Herring

This is a pickled herring dish greatly appreciated in the British Isles. Fresh herring are always used. The herring are first scaled, headed, split down the belly, and washed thoroughly. After draining, the inside of each fish is rubbed with a mixture of black pepper and fine salt. The herring are then laid in layers in a baking dish with a few whole cloves and bay leaves scattered over the layer of fish. When the dish is filled the fish are half-covered with vinegar and the dish is baked in a moderate oven (about 350° F.). This product will keep about 2 weeks at ordinary temperatures (Jarvis 1943a). Additional preparation in a somewhat different form is described in another section of this report. Small mackerel are also cured by this method.

Scandinavian Anchovies I

The true anchovy is not used in the preparation of this product. The bristling or sprat (*Clupea sprattus*) is used. In contrast to the Spanish or Portuguese anchovies (p. 157, ibid), Norwegian or Swedish anchovies are flavored with spices and the curing is not primarily a fermentation process. Various spice mixtures are used and the methods differ in detail but the following is typical: From 25 to 30 pounds of brisling are cured for 12 hours in a brine made of 4½ pounds of Liverpool salt and 7 quarts of water. At the end of the salting period the fish are laid on a wire screen to drain. The spice-salt mixture is then made up, with all spices well pulverized and the ingredients thoroughly blended. The sprats are stirred well in half of the spice mixture and packed in a large container where they are left to cure for 14 days. They are then repacked in individual containers in layers, bellies up. Some of the remaining spice mixture is scattered between each layer, with pieces of chopped bay and cherry leaves. On the bottom and on the top of each container two whole bay leaves are laid. The brine formed in the original spice cure is filtered and used to fill the smaller containers after packing. During the first few days after the containers are closed they must be rolled about and inverted at least every other day (Hoffman; undated).

The ingredients for the spice mixture and the amounts for the quantity of fish given here, are as follows:

2¼ lb. Luneberg salt	3 oz. sugar
3 oz. black peppers	½ oz. cloves
3 oz. allspice	½ oz. nutmeg
	½ oz. cayenne

Tin containers are preferred to wooden kegs, which are often leaky and the airtight seal of tin containers permits a longer period of preservation.

Scandinavian Anchovies II

Fresh brisling are placed in a strong salt brine from 12 to 24 hours. They are drained on a screen, and are packed in layers in small kegs after being rolled in a spice-curing mixture. Some of this mixture is scattered between the layers of fish. At the top, bottom, and in the middle of the keg, several bay leaves are laid. The kegs are packed tightly and are rolled about or inverted for 14 days. The anchovies may be repacked in tins in 14 days in summer or after 4 to 8 weeks in winter.

40 lb. brisling	7 oz. sugar
2¼ lb. Luneberg salt	1⅛ oz. cloves
	1⅛ oz. nutmeg
7 oz. black pepper	1⅛ oz. Spanish hops
7 oz. allspice	

The spices are ground and mixed with the salt.

Scandinavian Anchovies III

A third formula, from German sources, is as follows: The brisling are brine-salted in Norway in barrels holding about 100 kilograms (220 lb.). When the brisling are to be manufactured into anchovies, the barrels are taken out of cold storage and the fish washed throughly in a light brine testing 40° salinometer. After draining, the fish are packed loosely in new barrels with some of the spice mixture scattered between each layer of fish. The brine used for washing and the original brine are filtered and poured into the barrels after filling. The barrels are placed in cool storage for several months for the fish to ripen or acquire an aromatic flavor. The barrels should be rolled about daily or at the least, at intervals of two or three days. When the fish have completely absorbed the spice flavor they are repacked in small individual containers, small kegs holding about 7 pounds, cans holding from 2 to 5 pounds, and glass jars. The brine used in curing is filtered and filled into the containers when they have been packed with fish. In summer 0.5 percent benzoic acid may be added to the brine.

The spice mixture, in quantity for one barrel original weight, is as follows:

2 lb. black peppers	6 oz. Spanish hops
1 lb. allspice	2 oz. mace
1½ lb. sugar (best raw)	2 oz. cloves
	2 oz. cinnamon
1 lb. saltpeter	2 oz. ginger
1 lb. bay leaves	

Appetitsild

The largest size Norwegian style anchovies cured by the method just described are selected and after heading are cut into fillets, removing the backbone. The fillets are packed in oblong flat cans, flesh side up, with a bay leaf and a thin slice of lemon in each can. Filtered curing brine is poured into each can, which is sealed immediately. The cans are not processed.

Small fat herring may also be used in the preparation of anchovies or appetitsild. According to Jacobsen (1926), brisling, when cured as anchovies, should have a salt content of 10 percent and a moisture content of 40 percent. Fat herring when cured as anchovies should have a salt content of 14 percent and a moisture content of 45

or 50 percent. The blend of spices in anchovy curing is considered very important. The flavor must be a blend, with no single spice predominating. The best storage temperature is considered to be about 40° F.

Herring in Sour Cream Sauce

Mild-cure salt (Holland style) herring are filleted, saving the milts. The fillets are soaked in cold water for two hours. The milts are rubbed through a fine sieve. The fillets are drained of surplus moisture. The vinegar, wine, and spices are boiled together for a few minutes, then cooled, and after removing the spices, stirred into the sour cream, sweet cream, and milts. The fillets are packed in a container with sliced onions, then covered with the sauce. The whole is allowed to marinate in a cool place one week. The fish are then packed in glass jars, which are then filled with the sauce.

1 gal. keg Holland style herring
1 pt. white wine, dry
1 pt. sour cream
1 pt. sweet cream
½ pt. distilled vinegar
½ oz. mixed spices
2 cups onions, sliced thin

Herring in Wine Sauce

Wine sauce formulas in general are like the standard spice sauce formulas for herring, with the exception that the amount of vinegar is reduced one-half or three-fourths and wine used instead. A dry white, or burgundy-type red wine must be used. Sweet wines are not suitable. A sample wine sauce is given as follows:

1 qt. white wine
1 pt. vinegar, distilled (white)
4 oz. chopped onions
2½ oz. sugar
¼ oz. whole cloves
¼ oz. mustard seed
¼ oz. chili peppers
⅛ oz. bay leaves
⅛ oz. whole black peppers
⅛ oz. whole white peppers
¼ oz. whole allspice
1/16 oz. ground nutmeg
1/16 oz. cracked cinnamon
1/16 oz. cracked ginger
1/16 oz. crushed cardamom

First, the vinegar and wine are poured into a large covered jar, and the onions, sugar, and spices added. The jar is placed in a pan of boiling water for two hours. The jar is allowed to stand overnight. When the sauce is ready to be used it is strained to remove the spices.

If vinegar-salt-cure herring are being used, the herring fillets are cut in pieces of suitable size, rinsed in fresh water, drained, and packed in glass jars with a few fresh spices, such as bay leaves, chili peppers, and a slice of lemon. The jars are filled with wine sauce, then sealed. The amount of sauce above is enough for about 10 pounds of fish.

If ordinary salt herring are used, they are filleted and freshened in water. The drained fillets are packed in a stoneware crock, covered with 1 quart distilled vinegar 3 percent acidity (for 10 lb. herring) and allowed to stand 48 hours. The fillets are then cut in cubes and packed in jars, which are filled with wine sauce.

SALMON

Pickled salmon is packed commercially only in a few localities in northern Europe. It is prepared to some extent in the United States

but only for local use. Properly made, it is an appetizing article of food, with a length of preservation about equal to other pickled fish. Commercial formulae are derived from old, home recipes. Representative examples are given here.

Formula No. 1

Ten pounds of salmon are cut into individual serving portions. The pieces are washed well in cold water then drained and dredged in fine salt. The salt is drained off after 30 minutes, and the salmon simmered slowly until done. The warm fish are placed in an earthenware crock and covered with a vinegar spice sauce made as follows:

1 qt. distilled vinegar	½ tbs. bay leaves
1 qt. water	1 tbs. white peppers
½ cup olive oil	1 tbs. mustard seed
1 cup sliced onions	½ tbs. cloves
	½ tbs. black peppers

Cook the onions in olive oil slowly until they are yellow and soft. Add the rest of the ingredients and simmer the whole gently for 45 minutes. Allow the sauce to cool, then pour it over the fish, making sure that all pieces are covered. Allow the fish to stand for 48 hours then repack it in pint jars, with a slice each of lemon and onion and one bay leaf around the sides for decoration. Filter the spice sauce, then pour it over the top of the fish until the container is filled, then seal. This product should be held at 40° F. The method may also be used for shad and other large fish.

Formula No. 2

This formula was obtained from a Scandinavian source. The salmon must be absolutely fresh. After it has been well washed, the backbone is removed and the sides trimmed of the very thin belly flesh. It is then cut in small pieces of about one-fourth pound each. These are simmered in well salted water until they are done but not soft. A sauce is made of the water used in cooking (first filtered), equal parts of white wine and vinegar. The pieces of salmon are packed in wide-mouth glass jars with two or three thin slices of lemon, two bay leaves, four cloves, and four whole black peppers to each jar. The sauce is poured over the fish while still warm, so that all pieces are completely covered. A three-fourths-inch layer of olive oil is poured in the top of each jar. The jars are sealed and then stored in a dry, cool place.

Some mild-cure salmon is cut into two-inch cubes, freshened in cold water, and packed in spiced vinegar sauce or in wine sauce.

MACKEREL

Fillets

This formula, developed for mackerel, may be used for other fish. It has been obtained from German sources. The fish is cleaned and washed thoroughly, then cut into fillets, removing the backbone. Divide the fillets into 2-inch lengths and dredge in fine salt. Pick up with as much salt as will cling to the flesh and pack in a crock or tub. Let the fish stand for one to two hours, then rinse in fresh water. Cook the vinegar, water and other ingredients slowly and gently for 10 minutes after

reaching boiling point. Add the fish and cook slowly for 10 minutes longer, counting from the time at which the solution again begins to boil after the fish has been put in. Remove the fish and allow the pieces to drain, then pack them in sterilized jars, adding some chopped onion, a bay leaf, a few spices, and a slice of lemon to each jar. Strain the spice vinegar sauce and bring to a boil. Fill the containers with hot sauce and seal immediately. Store in a cool, dry place.

10 lb. mackerel fillets
2 qt. distilled vinegar
3 pt. water
2 cups chopped onion
1 clove garlic, chopped
2 oz. sugar
1 tbs. allspice
1 tbs. cloves
1 tbs. black peppers
1 tbs. bay leaves
1 tbs. crushed nutmeg

HADDOCK

Fillets

This formula is designed for haddock but may be used for almost any other large fish. The haddock are cleaned carefully, skinned, and cut into fillets, removing the backbone. The fillets are cut in pieces about 2 inches square. These are washed, drained, then put in a tub and covered with a 90° to 100° salinometer brine. They are left in brine from 1 to 6 hours, depending on individual preference. The fish are rinsed in fresh water, then packed in a crock or large pot as follows: A few spices and pieces of sliced onion are scattered on the bottom. Then, pack in a layer of fish, cover with a scattering of spices and sliced onion, and continue until all the fish are packed. The fish are covered with a solution of two parts vinegar and one part water, adding a small piece of alum about the size of a walnut. Boil slowly until the fish may be pierced easily with a fork. After cooling, the product is packed in glass containers, adding a few fresh spices, a bay leaf, and a slice of lemon around the side of the jar for decoration. A few slices of onion may also be packed with the fish. Strain the vinegar sauce, heat it, and pour over the fish until the top is well covered. Seal the containers immediately. For maximum preservation, store this product under refrigeration. Amounts given below should be sufficient for 10 pounds of fish ready for pickling:

10 lb. haddock fillets
2 qt. distilled vinegar (6 percent)
1 qt. water
½ oz. white peppers
½ oz. chili (red) peppers
½ oz. allspice
¼ oz. cloves
¼ oz. mustard seed
¼ oz. bay leaves
¼ lb. sliced onions

STURGEON

This method is used for sturgeon, pike, pickerel, salmon, herring, trout, and other fish. It is a commercial formula of German origin. Ten pounds of fish are washed well and cut in small individual serving-size portions, from 2 to 4 ounces each. These pieces are dredged in fine salt and left from 1 to 3 hours. The salt is rinsed off, the pieces are dried, and brushed with good cooking oil. They are laid on a grill and broiled over a hot fire until both sides are a light brown. They should be brushed with cooking oil during the process. The fish is allowed to cool, then packed in glass

containers with a slice or two of lemon, bay leaves, onion, and a scattering of rosemary, whole black peppers, and whole cloves between the layers of fish. The jars are filled with a marinade made of white wine, vinegar and water, sealed immediately, and stored in a dry, cool place.

10 lb. sturgeon
½ lb. lemon slices
½ lb. sliced onions
1 oz. whole black peppers
½ oz. whole cloves
1 qt. white wine
1 qt. distilled vinegar
1 pt. water
¼ oz. rosemary

Thyme may be substituted for rosemary, and the spice combination may be otherwise altered to suit the individual preference.

Escabeche

This recipe is of Spanish origin. Escabeche was brought to Spain by the Romans who, in turn, had it from the Greeks. It is probably the most popular Spanish method of preserving fish and is found in all Latin-American countries. Though there are many local variations, all are founded on the basic recipe. Mackerel, kingfish (king mackerel), tuna, and corvina are the fish most used for escabeche. Almost any fish may be used although soft-fleshed fish do not make so good a product.

10 lbs. fish
1 qt. distilled vinegar
2 tbs. bay leaves
1 tbs. black peppers, whole
1 pt. olive oil
1 tbs. red (chili peppers)
½ tbs. cumin seed
½ tbs. marjoram

Cut the fish into small serving portions. Wash the pieces thoroughly, drain and place in a 90° salinometer brine for ½ hour. Then wipe the fish dry. Pour the olive oil into a frying pan, together with a clove of minced garlic, half a dozen bay leaves, and a few red peppers; then heat the pieces until they are light brown in color and lay aside to cool.

Add onions to the oil and cook them until they are yellow. Then add black peppers, cumin seed, marjoram, and vinegar. Cook slowly for 15 to 30 minutes and cool. When the fish are cold, pack into sterilized jars with the rest of the bay leaves and red peppers. Fill the jars with sauce and close immediately. This preparation may be used after 24 hours but it tends to improve with storage. It will keep about 3 weeks in summer; much longer if stored in a cool place.

Pickled Eels

This dish is a favorite in northern Europe, from the British Isles to Sweden. Clean and skin the eels and cut them into pieces about ¾-inch thick. Wash and drain the pieces, then dredge in fine salt and allow to stand from 30 minutes to 1 hour. Rinse off the salt, wipe the pieces dry, and rub them with a cut clove of garlic. Brush the eel with melted butter and broil until both sides are a light brown. As an alternative, pieces may be sauted in olive oil or other good salad oil. Places the pieces of cooked eel on absorbent paper. When the pieces are cool, pack them in layers in a crock with a scattering of sliced onion, allspice, bay leaves, mustard seed, whole cloves, peppers, and mace between the layers of fish.

Weight the mixture down to keep it compressed. Cover the fish with a cold vinegar sauce made of vinegar, water, onions, and a few bay leaves cooked for 15 to 20 minutes. After standing for 48 hours in a cool place pack the eels in glass tumblers with a thin slice of lemon, a bay leaf, a slice of onion, and a few fresh whole spices for decoration. Fill the tumblers with sauce used in curing, which has been filtered. Seal the containers immediately. Store in a cool, dry place. This article remains in good condition for a considerable period of time.

OYSTERS

In the eighteenth and nineteenth centuries pickled oysters were prepared commercially over most of the Atlantic coast area. According to Stevenson (1899) pickled oysters were consumed extensively around New York during the Christmas holidays. They are not nearly so popular now and are usually prepared only for special orders. Some pickled oysters are prepared in Virginia for local consumption. Various formulae are available, some from traditional colonial sources, while others may be found in French or other continental cookbooks. Two typical formulae are given here:

Virginia Pickled Oysters I

Open one gallon of oysters, saving the liquor. Strain the liquor and add sufficient salted water to bring the amount up to 3 pints. Simmer the mixture gently over a low flame. When the liquor is near the boiling point, add the oysters a few at a time, cooking until the "fringe" curls. The oysters are then removed from the liquor and set aside to cool. Make a sauce of vinegar, white wine, bay leaves, onion, garlic, parsley, fennel, thyme, cloves, black pepper, allspice, cinnamon, and mace. Add this sauce to the oyster liquor and simmer 30 to 45 minutes. When it is cool, pack the oysters in glass jars with a bay leaf, slice of lemon, and a few fresh spices in each jar. Strain the liquor and when it is cool pour it into jars, seal immediately, and store in a cool, dark place. The oysters are ready for use in 10 to 14 days.

- 1 gal. shucked oysters
- 3 pt. oyster liquor
- 1 pt. distilled vinegar
- 1 pt. white wine, dry
- 2 tbs. ground onion
- 2 cloves garlic, crushed
- 2 tbs. bay leaves, crushed
- 1 tbs. chopped parsley stems
- 1 tbs. crushed fennel
- 1 tbs. crushed allspice
- 1 tbs. crushed black peppers
- 1 tbs. crushed cloves
- 1 tbs. crushed stick cinnamon
- ¼ tbs. crushed mace
- ¼ tbs. crushed thyme

Pickled Oysters II

Blanch one gallon of freshly opened oysters until the fringe curls. Remove the oysters and set them out to cool. Bring the liquor used in blanching to the boiling point, then set aside to cool. At the same time cook the vinegar and spices together slowly, after which strain out the spices. Combine the oyster liquor and spiced vinegar. Pack the oysters in glass tumblers

with a bay leaf and a thin slice of lemon in each. When the sauce is cool, strain it and pour over oysters until the containers are filled. Seal the tumblers immediately and store in a cool, dark place.

1 gal. shucked oysters	½ oz. allspice, whole
2 qt. oyster liquor	½ oz. black peppers whole
1 qt. vinegar	
½ oz. cloves, whole	1 blade mace

Mussels

This formula may also be used in pickling clams and oysters. Scrub the shells well and steam just enough to open the shells. Save the liquor or nectar. Remove the meats from the shells, cutting out the byssus or beard. Cool meats and nectar separately. When cool, pack the meats in sterilized glass jars with a bay leaf or two, a few whole cloves, and a thin slice of lemon to each jar.

Strain the liquor obtained in steaming the shellfish. To each quart of liquor add one-half pint distilled vinegar, one-half tablespoon each of allspice, cloves, and red peppers, with one-quarter teaspoon of cracked whole mace. Some recipes for pickled mussels call for white wine or wine vinegar instead of distilled vinegar. The amount of wine or vinegar is a matter of personal taste. Simmer for 45 minutes. When the sauce is cool, pour into the jars, and seal. Store in a cool, dark place. This product will be ready for use in about two weeks. Pickled mussels and oysters turn dark if exposed to the light.

SHRIMP

Pickled shrimp is a regional specialty of the New Orleans area but is sold in fish markets from Key West to Washington, D. C. There are no standard recipes but those given here are believed to be typical.

Pickled or Spiced Shrimp Formula I

Peel the green shrimp and wash them well. Make a brine of 1 gallon water, ½ cup salt, 1 pint distilled vinegar, 1 tablespoon red peppers, ½ tablespoon cloves, ½ tablespoon allspice, ½ tablespoon mustard seed, and 6 bay leaves. Simmer the brine slowly for ½ hour, then bring it to the boiling point and add the shrimp. When they have cooked for 5 minutes, counting from the time the brine again begins to boil, they should be removed and allowed to cool. Pack in sterilized jars with a bay leaf, a few fresh spices, and a slice of lemon in each jar. Fill the jars with a solution made in the proportions of 2 pints of water, 1 pint of 5 percent distilled vinegar, and 1 tablespoon sugar. Seal the jars tightly and store in a cool, dark place. These pickled shrimp keep longer than those prepared by the second method, but the second pickled shrimp product requires less labor and is cheaper.

Pickled or Spiced Shrimp Formula II

Take 5 pounds of fresh, green headless shrimp. Wash them well but do not remove the shells. Put celery tops, salt, parsley, thyme,

bay leaves, vinegar, and spices into the water. When this has boiled about 45 minutes, add the shrimp. Let boil 10 minutes, then set the pot aside and allow the shrimp to cool in the liquor. Drain and pack in small cartons with some of the spices. This product remains in good condition only a very short time unless held under refrigeration.

5 lb. shrimp
1 gal. water
1 pt. vinegar, distilled
2 cups salt
1 bunch celery tops
1 small bunch parsley
1 tbs. allspice
1 tbs. bay leaves
1 tbs. red (chili) peppers
1 tbs. black peppers
½ tbs. cloves
1 blade mace

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